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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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April 1972

U.S. Employment Service
Technical Report

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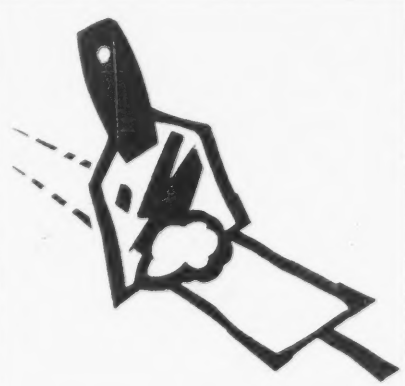
Development of USES

APTITUDE TEST BATTERY FOR

TAPER

(const.)
842.884

U.S. DEPARTMENT OF LABOR
Manpower Administration



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Technical Report on Development of USES Aptitude Test Battery

For

Taper (const.) 842.884

S-464

(Developed in cooperation with the
Colorado
State Employment Service)

Manpower Administration
U. S. Department of Labor
April 1972

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average and a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB #2861

Development of USES Aptitude Test Battery

For

Taper (const.) 842.884-022

S-464

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Taper (const.) 842.884-022.

The following norms were established on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

GATB Aptitudes	Minimum Acceptable GATB Scores
P-Form Perception	80
F-Finger Dexterity	70
M-Manual Dexterity	75

RESEARCH SUMMARY

Sample:

Fifty male employees working through the Painters Union (Local #79) located in Denver, Colorado. The sample was composed of 5 Mexican Americans and 45 nonminority group subjects.

Criterion:

Union Officials' Ratings.

Design:

Concurrent (test and criterion data were collected at about the same time).

Concurrent Validity:

Phi coefficient = .46 ($P/2 < .005$)

Effectiveness of Norms:

Only 64% of the nontest-selected individuals used for this study were good performers; if they had been test-selected with the above norms, 78% would have been good performers. 36% of the nontest-selected individuals used for this study were poor performers; if they had been test-selected with the above norms, only 22% would have been poor performers. The effectiveness of the norms is shown in Table 1.

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Performers	64%	78%
Poor Performers	36%	22%

SAMPLE DESCRIPTION

Size:

N = 50

Sex Composition:

The sample was composed of 50 males.

Minority Group Composition:

The sample was composed of 5 Mexican Americans and 45 nonminority group individuals.

Occupational or Educational Status:

Employed workers.

Work or Educational Setting:

Workers were employed by the following firms:

A & A Wallboard Co.
Craftsman Painters & Decorators
Denver Dry Wall Co.
Drywall Interiors Inc.
Ben Edgin Painting Co.
Gardineer Dry Walling Co.
Ginther Painting & Decorating Co.
Heggem Lundquist Paint Co.
Intermountain Drywall Co., Inc.
Production Painting & Drywall Co.
Schriber Decorating Co.
Sparks Drywall

Selection Requirements:

Education: None required.

Previous Experience: None required.

Tests: None used.

Other: Personal interview.

Principal Activities:

The job duties are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All individuals in the sample had at least 6 months' job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criteria r_1 (Ratings on the Ames Tools) and r_2 (Ratings on the Hand Tools) for Age, Education, Total Experience, and Cultural Exposure

	Mean	SD	Range	r_1	r_2
Age (years)	38.4	11.2	22-64	-.557**	.017
Education (years)	11.1	2.0	4-15	.292	.019
Experience (months)	144.9	83.4	6-300	.093	.138
Cultural Exposure	2.3	1.4	0-6	.334*	.050

*Significant at the .05 level
**Significant at the .01 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, and the Research-Questionnaire Background were administered during the months of April and May 1970.

CRITERION

The final criterion consisted of a multiple hurdle criterion of ratings of the sample members proficiency on the Ames tool and hand tools. Since the correlation between these two ratings is .383 and since each rating covered a different aspect of performance, a multiple hurdle criterion was used. Each individual was rated by three union officials.

Rating Scale:

The rating scale (see Appendix) consisted of four items with five alternatives which measured the subjects proficiency with both the Ames and hand tools.

Reliability:

A reliability coefficient of .802 was obtained between the first Union Official rating and the second Union Official rating. A reliability coefficient of .870 was obtained between the first Union Official rating and the third Union Official rating. A reliability coefficient of .825 was obtained between the second Union Official rating and the third Union Official rating. Therefore, the final criterion consists of the total of the three scores.

Criterion Distribution:

	Ames Tool	Hand Tools
Possible Range:	12-60	12-60
Actual Range:	12-60	25-60
Mean:	40.3	53.2
Standard Deviation:	16.7	7.4

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 36% of the sample in the low group to correspond with the percentage of individuals considered unsatisfactory or marginal by the supervisor. Workers in the high criterion group were designated as "good performers" and those in the low group as "poor performers." The criterion critical scores are 28 on the Ames tool rating and 46 on the hand tool rating.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were chosen for tryout in the norms on the basis of qualitative and statistical results shown in Tables 3 and 4. Aptitudes not judged irrelevant are selected for trial norms when significantly correlated with a criterion or when judged to have critical importance, or when they meet any two of the following criteria: (1) judged important, (2) relatively high mean, (3) relatively low standard deviation. A relatively high mean or low standard deviation may indicate some sample preselection. Table 5 summarizes these factors and shows the aptitudes selected.

TABLE 3

Qualitative Analysis

(Based on the job analysis, the aptitudes indicated appear to be important to the work performed.)

Aptitude	Rationale
P-Form Perception	Necessary to perceive pertinent detail to locate rough spots, nail and screw dimples, to visually determine width and length of tape needed to cover joints and to apply tape-type metal corners and trim.
K-Motor Coordination	Necessary to apply tape and proper amount of joint compound to rough spots, nail and screw dimples.
F-Finger Dexterity	Necessary to turn and place the tape, to manipulate the trowel, broad-knife or spatula when applying the sealing compound and the cementing material and to press the tape into the sealing compound and smooth the surface.
M-Manual Dexterity	Necessary for sanding rough spots, to press the tape on the wallboard and float cementing material, to mix sealing compound and to apply hand rolled texture to wall.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criteria r_1 (Ratings on the Ames Tools) and r_2 (Ratings on the Hand Tools) for the Aptitudes of the GATB, N = 50

Aptitude	Mean	SD	Range	r_1	r_2
G - General Learning Ability	98.0	16.8	61-140	.328*	.085
V - Verbal Aptitude	97.4	14.7	68-133	.161	.009
N - Numerical Aptitude	93.6	18.2	47-134	.278	.044
S - Spatial Aptitude	104.3	18.2	65-137	.266	.127
P - Form Perception	102.4	21.8	41-141	.380**	-.063
Q - Clerical Perception	106.4	15.8	69-153	.227	-.001
K - Motor Coordination	95.8	15.0	68-134	.260	.057
F - Finger Dexterity	95.5	20.5	47-135	.301*	.072
M - Manual Dexterity	92.8	16.2	59-132	.406**	.183

*Significant at the .05 level
**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

	Aptitudes								
Type of Evidence	G	V	N	S	P	Q	K	F	M
"Important" on Basis of Job Analysis					X		X	X	X
"Irrelevant" on Basis of Job Analysis									
Relatively High Mean				X	X	X			
Relatively Low Standard Deviation		X							
Significant Correlation with Criterion 1	X				X			X	X
Significant Correlation with Criterion 2									
Aptitudes Selected for Trial Norms	G				P			F	M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, P, F, and M at trial cutting scores were able to differentiate between the 64% of the sample considered to be good performers and the 36% of the sample considered to be poor performers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The phi coefficient was used as a basis for comparing trial norms. Norms of P-80, F-70 and M-75 provided optimum differentiation for the occupation of Taper (const.) 842.884.

The validity of these norms is shown in Table 6 and is indicated by a phi coefficient of .46 (statistically significant at the .005 level).

TABLE 6

Concurrent Validity of Test Norms

P-80, F-70, and M-75

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Performers	3	29	32
Poor Performers	10	8	18
Total	13	37	50

Phi coefficient = .46
Significance level = P/2 < .005

Chi square (Yates' corrected) = 10.5

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-56 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .39 is obtained with the OAP-56 norms of P-75, F-80 and M-80.

APPENDIX

SP-21
Rev. 5/67

UNITED STATES EMPLOYMENT SERVICE

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

SCORE_____

RATING SCALE FOR_____
D.O.T. Title and Code

Directions: Please read the "Suggestions to Raters" and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

SUGGESTIONS TO RATERS

We are asking you to rate the job performance of the people who work for you. These ratings will serve as a "yardstick" against which we can compare the test scores in this study. The ratings must give a true picture of each worker or this study will have very little value. You should try to give the most accurate ratings possible for each worker.

These ratings are strictly *confidential* and won't affect your workers in any way. Neither the ratings nor test scores of any workers will be shown to anybody in your company. We are interested only in "testing the tests." Ratings are needed only for those workers who are in the test study.

Workers who have not completed their training period, or who have not been on the job or under your supervision long enough for you to know how well they can perform this work should not be rated. Please inform the test technician about this if you are asked to rate any such workers.

In making ratings, don't let general impressions or some outstanding trait affect your judgment. Try to forget your personal feelings about the worker. Rate him only on the way he does his work. Here are some more points which might help you:

1. Please read all directions and the rating scale *thoroughly* before rating.
2. For each question compare your workers with "workers-in-general" in this job. That is, compare your workers with other workers on this job that you have known. This is very important in small plants where there are only a few workers. We want the ratings to be based on the same standard in all the plants.
3. A suggested method is to rate all workers on one question at a time. The questions ask about different abilities of the workers. A worker may be good in one ability and poor in another; for example, a very slow worker may be accurate. So rate all workers on the first question, then rate all workers on the second question, and so on.
4. Practice and experience usually improve a worker's skill. However, one worker with six months' experience may be a faster worker than another with six years' experience. Don't rate one worker as poorer than another because he has not been on the job as long.
5. Rate the workers according to the work they have done over a period of several weeks or months. Don't rate just on the basis of one "good" day, or one "bad" day or some single incident. Think in terms of each worker's usual or typical performance.
6. Rate only the abilities listed on the rating sheet. Do not let factors such as cooperativeness, ability to get along with others, promptness and honesty influence your ratings. Although these aspects of a worker are important, they are of no value for this study as a "yardstick" against which to compare aptitude test scores.

Name of worker (*print*)_____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?	How long have you worked with him?
☐ See him at work all the time.	☐ Under one month.
☐ See him at work several times a day.	☐ One to two months.
☐ See him at work several times a week.	☐ Three to five months.
☐ Seldom see him in work situation.	☐ Six months or more.

Rated by..... Title..... Date.....

Company or organization..... Location.....
(City) (State)

DRY WALL FINISHERS

RATE EACH - PARTS A THRU D
(Low 1 - High 5)

IDENTIFICATION		AMES TOOL				HAND TOOL				TOTAL		
		QUANTITY	QUALITY	KNOWLEDGE	EASE	QUANTITY	QUALITY	KNOWLEDGE	EASE			
		A	B	C	D	E	F	G	H			1
	1											
	3											
	4											
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FACT SHEET

Job Title

Taper (const.) 842.884-022

Job Summary

Prepares plasterboard or other wallboards for painting or papering by filling and smoothly covering joints between boards, rough spots and nail or screw dimples which were formed during installation.

Work Performed

Spreads sealing compound over joints between boards using trowel, broad-knife or spatula. Places paper tape over the sealing compound and presses sufficiently to embed tape into compound and seal joint or corner. Spreads and smooths cementing material over tape, using trowel or floating machine to blend joint or corner with wall surface. May otherwise use automatic taper (Ames tool) which applies tape and proper amount of joint compound simultaneously to flat joints or corners by pressing the tool against the joint and moving tool continually along the joint. Smooths cement using trowel to blend joint with wall surface.

Floats cementing material over rough spots and nail or screw dimples or may float cementing material over entire wall surface to attain smooth, plaster-like surface using trowel.

May sand rough spots after cement has dried. May fill cracks and holes in walls and ceiling with sealing compound.

May mix sealing compound by adding water and stirring vigorously by hand or with a portable electric mixer until the desired composition is attained.

Effectiveness of Norms:

Only 64% of the nontest-selected individuals used for this study were good performers; if they had been test-selected with the S-464 norms, 78% would have been good performers. 36% of the nontest-selected individuals used for this study were poor performers; if they had been test-selected with the S-464 norms, only 22% would have been poor performers.

Applicability of S-464 Norms:

The aptitude test battery is applicable to jobs which include a majority of the job duties described above.

GPO 932-221